Space Weather Forecast

Issued on Monday, 25 September 2023 at 01:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Isolated Moderate flares likely, with a slight chance of Strong flares (R1-R3 Radio blackouts). G1-G2 minor/moderate geomagnetic storms likely day 1 (25 Sep) with a slight chance of G3/Strong storms.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with a single Moderate class flare observed in the past 24hrs, from a region in the southeast. Frequent Common class flares were also observed, some long lasting. AR3445 was the most active and developmental region on the disc, with ongoing flux emergence leading to a small delta spot developing. There are a total of ten sunspot regions on the disc, with AR3443 in the northwest and AR3435 in the north-centre disc persisting as moderately sized regions, although less active than recent days. Despite this AR3435 remains notable as an anti-Hale cycle spot, while AR3443 maintained some slight complexity with a small reverse polarity region following its main trailer spots.

A filament eruption over the NW limb has been observed, with a coronal mass ejection seen on early imagery. This is unlikely to be Earth-directed, pending further analysis. No other Earth-directed coronal mass ejections have been observed in the past 24hrs.

Solar Wind / Geomagnetic Activity: Slow wind conditions persisted for much of the day before a coronal mass ejection arrived late on 24 Sep. Speeds increased from background to slow ambient. The Interplanetary magnetic field strength, was initially weak before becoming strong around 24/2043 UTC. The north-south component (Bz) also rose from weak to negatively strong. Resultant geomagnetic activity was Quiet to Unsettled (Kp 1-3) with a G1/Minor Storm (Kp5) interval between 24/1800-2100 UTC then a G2/Moderate storm interval between 24/2100-2400 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background with no Solar Radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Forecast to persist at Moderate with further isolated Moderate flares likely. There is also a slight chance of rising to High due to the potential for isolated Strong flares from the sunspot region in the southeast.

Solar Wind / Geomagnetic Activity: Ongoing impacts from a coronal mass ejection arrival on 24 Sep remain likely through the first part of day 1 (25 Sep). Further coronal mass ejection arrivals are possible into day 2 (26 Sep). Confidence is low however, with a glancing impacts most likely. The slightly elevated solar winds are expected to continue through day 1 (25 Sep), likely easing thereafter to slow ambient.

Geomagnetic activity is likely to remain enhanced initially with G1/Minor or G2/Moderate storming and a chance of G3/Strong storm intervals during the first part of day 1. Geomagnetic activity will then likely reduce back to Unsettled to Active with a chance of G1/Minor storm intervals should any subsequent glancing CMEs occur into day 2 (26 Sep). Quiet to Unsettled activity is then expected dominate toward the end of the forecast period.

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Met Office Space Weather Forecast

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to remain at moderate to background with no Solar Radiation storms occurring.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	70	30	20	5
Strong	G3	No	10	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	60	60
Very Active	R3 to R5 X	No	20	20	15	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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